

REMARKS

Responsive to the requirement for restriction, applicants elect Group I, claims 20-28, drawn to a method for determining the quality of plant material, with traverse.

It is believed that the requirement cannot properly be repeated, for the following reasons:

The requirement rests on the assumption that determining a chlorophyll fluorescence image of a plant material irradiated with a beam of electromagnetic radiation is shown in WO 01/00333.

We cannot agree with this.

The present invention is concerned with measuring a characteristic chlorophyll fluorescence image which is a measure for the quantum efficiency of the photosynthetic system of plant material.

The method of the invention comprises

- irradiating plant material with a beam of electromagnetic radiation comprising one or more such wavelengths that at least a part of the chlorophyll present is excited by at least a part of the radiation, the beam of electromagnetic radiation having such a shape that only a small part of the plant material is irradiated, and the beam being moved over the plant material such that a larger part of the plant material is irradiated,

- measuring the fluorescence radiation originating from the plant material associated with the chlorophyll transition with an imaging detector for obtaining a chlorophyll fluorescence image,

wherein, in any given order,

- during a certain duration of time several fast scans are made over the plant material with the electromagnetic beam for obtaining a chlorophyll fluorescence image  $F_{fast}$ , and

- during a certain duration of time a slow scan is made over the plant material with the electromagnetic beam for obtaining a chlorophyll fluorescence image  $F_{slow}$ .

According to the invention, the characteristic chlorophyll fluorescence image that is a measure for the efficiency of the photosynthetic system of plant material is calculated from the chlorophyll fluorescence images  $F_{fast}$  and  $F_{slow}$ .

WO 01/00333, which document was cited in the International Search Report and considered in the IPER, is directed to a method for sorting products, wherein the products to be sorted are conveyed in the shape of a product stream extending in the width over a specific path, the products to be sorted are scanned over the width by casting light onto the products in at least a spectrum which is selected such that certain products of the products to be selected will emit light, observing this light and selecting the scanned products as a

function of the observed light (see claim 1). The selection is preferably made on the basis of the intensity of the emitted light (page 4, lines 10-19).

As examples of products to be sorted, WO 01/00333 mentions separating waste products such as stones, pieces of wood, plastic, etc., from products containing chlorophyll, such as, for example, peas, which emit light as a result of fluorescence (page 5, lines 1-17).

WO 01/00333 discloses scanning plant material with a laser beam and measuring the chlorophyll fluorescence thereof, for example, with a camera. According to WO 01/00333 the product stream may be scanned with a laser beam over its width. Scanning each product or part thereof is not mentioned explicitly, but may take place. However, WO 01/00333 does not disclose or suggest both making a slow scan and (a number of) fast scans in order to obtain two different images  $F_{slow}$  and  $F_{fast}$ , and calculating a characteristic chlorophyll fluorescence image that is a measure for the efficiency of the photosynthetic system of plant material therefrom.

Said characteristic chlorophyll fluorescence image may be calculated by using the formula  $IQP = (F_{slow} - F_{fast}) / F_{slow}$  (IQP: Imaging Quantum Efficiency of Photosynthesis). A computer may carry out this calculation for each image pixel of the images  $F_{fast}$  and  $F_{slow}$  to obtain the characteristic chlorophyll fluorescence image (see panel C of Figure 2). The IQP is

directly related with the quality of the plant material, for example, the health of the plant. The method of the invention also enables to detect spots on plant material having a lower quality, such as damages on leaves caused by diseases.

The methods of claims 20-28 distinguish from that of WO 01/00333 in that the two different images are obtained from which a characteristic chlorophyll fluorescence image that is a measure for the efficiency of the photosynthetic system of plant material is calculated. The devices of claims 29 and 30 and 36-39 comprise means for processing the two images  $F_{fast}$  and  $F_{slow}$  and means for calculating a characteristic chlorophyll fluorescence image that is a measure for the efficiency of the photosynthetic system of plant material, from  $F_{fast}$  and  $F_{slow}$ , meaning these claims have a specific technical feature in common with claims 20-28 which feature distinguishes from the method and device of WO 01/00333. The methods of claims 31-32 and the devices of claims 34 and 35 refer to claims 20 and 29, respectively, and therefor also include the common specific technical feature of those claims.

In view of the above, therefore, an action on the merits of all of the claims now in the case is believed to be in order, and the same is respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON

A handwritten signature in black ink, consisting of a series of connected, wavy loops, positioned above a horizontal line.

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